

## Section 12.0

# Force Protection Design Criteria

### 12.1 INTRODUCTION

Accommodating the need for security and antiterrorism is a significant concern for Fort Wainwright facilities design. The security and antiterrorism requirements must be integrated into the total project. Design of protective elements should seek to visually enhance and complement the design of a facility. Site elements such as fences, courtyards, screen walls, swales, berms, planters, and retaining walls can be used effectively for facility protection. These design elements should be designed to provide visual harmony with the main facility, producing architectural compatibility through consistent use and application of materials, forms, and colors.

The purpose of this document is to provide general guidance on force protection issues for the planning, design, and construction of Fort Wainwright's facilities and to reduce the vulnerability of its personnel to terrorist attacks. See Figure 12.1a. It is intended to raise the level of awareness among commanders, planners, designers, engineers, security personnel, and facility users to the issues of force protection that must be considered to minimize loss of personnel and property by planning for force protection and implementing physical security measures as the threat increases. See Figure 12.1b. Force protection refers to measures designed to protect personnel, facilities, and equipment that support national defense missions. This document contains guidelines intended to be applied when and if the U.S. Army Garrison, Alaska determines the need exists. These measures are aimed at minimizing loss of life and other critical assets. Implementing of force protection should be based on the assessment of the threat, resources available, and command decision.

The designers must work to balance force protection requirements with all other requirements that impact design and development. These include the [Americans with Disabilities Act Accessibility Guidelines](#) (ADAAG), the [Uniform Federal Accessibility Standards](#) (UFAS), [National Fire Protection Codes](#) (NFPA), and all applicable local building

# 12



▲ **Figure 12.1a**

*Entry Control Facility Design Does Not Provide Visual Harmony and Architectural Compatibility at the Main Gate*



▲ **Figure 12.1b**

*Security Forces Perimeter Defense Duties Have Greatly Intensified Since 9-11 Terrorist Attack*

codes and ordinances. The design team will also consult security personnel to determine whether portions of the design documents are subject to access limitations.

## 12.2 BUILDING SITING AND DESIGN STANDARDS

### 12.2.1 Antiterrorism Standards

A primary concern for Army installations throughout the world is the threat of terrorist attack. To minimize the likelihood of mass casualties from terrorist attacks against DoD personnel in the buildings in which they work and live DoD has developed the [Unified Facilities Criteria \(UFC\) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings](#). See Figure 12.2a.



**Figure 12.2a**  
*Elements of Minimum Protection for Site Design*

UFC 4-010-01 establishes the minimum building antiterrorism standards for all DoD components.

- Mandatory DoD minimum antiterrorism standards for new and existing inhabited buildings are contained in Appendix B.
- Mandatory DoD minimum antiterrorism standards for expeditionary and temporary structures are contained in Appendix D.
- Additional recommended measures for new and existing, inhabited buildings are contained in Appendix C.

Implementation of the mandatory standards is obligatory for all new construction regardless of the funding source. See Figure 12.2b. These standards apply to FY 2004, and all subsequent fiscal years, for projects involving new construction and major renovations for inhabited structures. This includes renovations where these cost exceed 50 percent of the replacement cost of buildings. Where the 50 percent

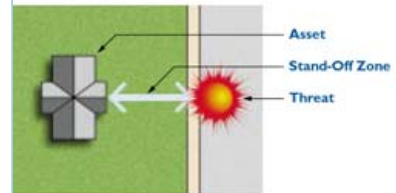


**Figure 12.2b**  
*Antiterrorism Standards Required for all New Construction*

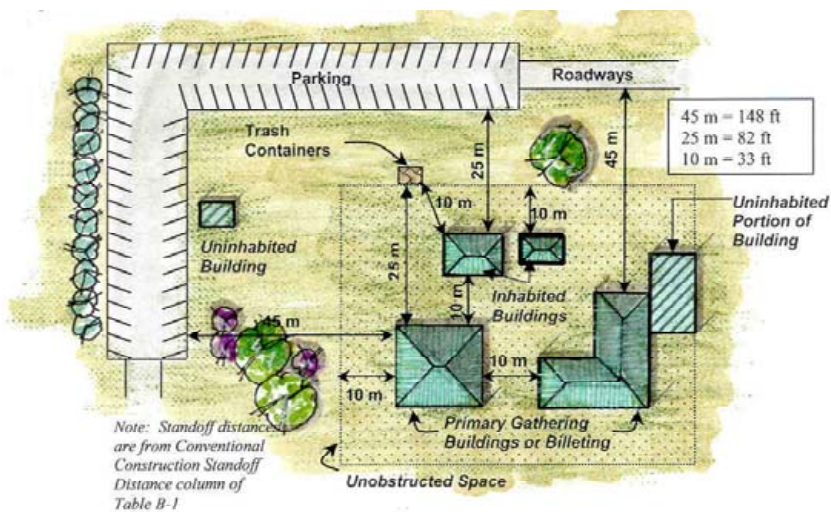
threshold is not met, compliance with these standards is only recommended and not required. The standards will be reviewed before any site planning or design is initiated.

The minimum standoff distances and separation for buildings is the distance between an asset and a threat. See Figure 12.2c. There is no ideal stand-off; it is determined by the type and level of threat, the type of construction, and desired level of protection:

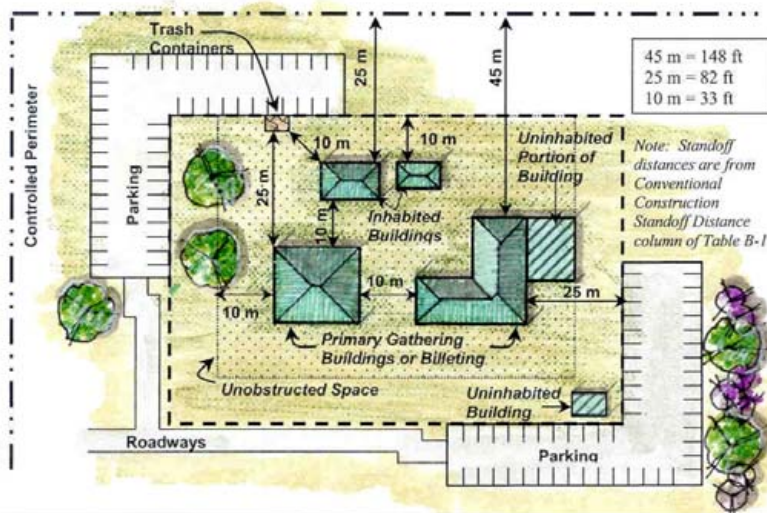
- The minimum standoff distances and separation for new and existing buildings are found in Table B-1 of [UFC 4-010-01](#). See Figures 12.2d and 12.2e.



▲ **Figure 12.2c**  
Concept of Stand-Off Distance



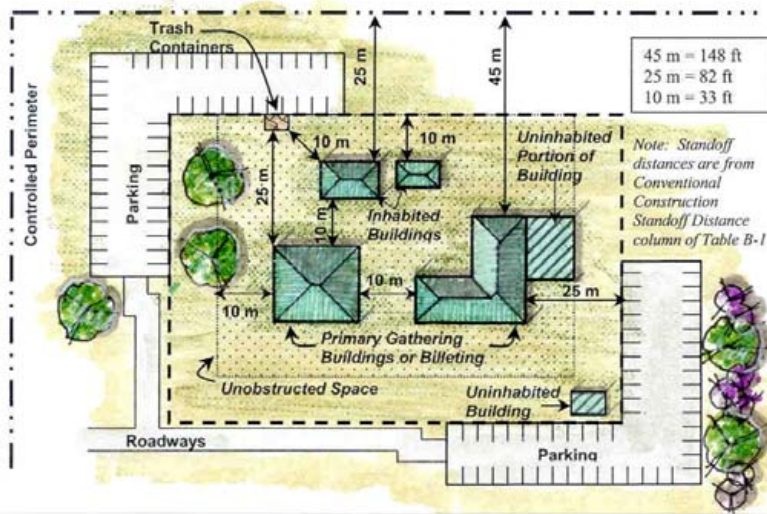
▲ **Figure 12.2d**  
Criteria for Stand-Off Distances and Building Separation – No Controlled Perimeter



▲ **Figure 12.2e**  
Criteria for Stand-Off Distances and Building Separation – Controlled Perimeter



- The minimum standoff distances and separation for expeditionary and temporary structures are found in Table D-1 of [UFC 4-010-01](#). See Figure 12.2f.



▲ **Figure 12.2f**

*Stand-Off Distances and Separation for Expeditionary and Temporary Structures*

The DoD minimum standards, when applicable, may be supplemented by more stringent force protection building standards to meet specific threats inherent in the geographical area where the facility is to be constructed. Those additional requirements may be established by either standards for specific Combatant Commanders or based on Risk and/or Threat Analysis.

When the minimum standoff distances can not be achieved because land is unavailable, the standards allow for building hardening to mitigate blast effects. Costs and requirements for building hardening are addressed in the DoD Security Engineering Manual. For information regarding the DoD Security Engineering Manual see following section.

### 12.2.2 Implementing Design Guidance

Additional guidance on applying the antiterrorism standards is found in [UFC 4-010-02, DoD Minimum Antiterrorism Standards for Buildings](#).

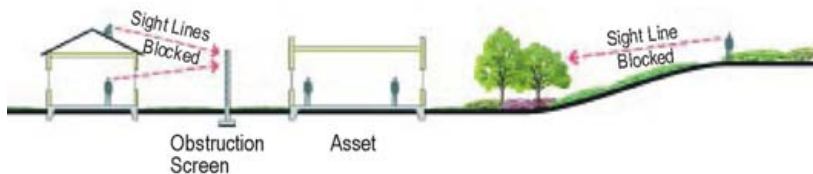
**12.2.2.1 Website Access for Military and Government Users.** This is a password protected website. To enter the site you must be accessing the site from either a “.mil” or “.gov” address. Upon initial entry, you will be prompted with instructions on how to acquire your password.

**12.2.2.2 Website Access for Non Military and Government Users.** Currently, the Protective Design Center is developing a procedure for emailing the network administrator to receive procedures to enter the site. If upon initial entry into the site there are no instructions on this procedures, contact the [Protective Design Center](#) (CENWO-ED-S) at (402) 221-3151 for instructions.

### 12.2.3 Orientation of Buildings on a Site

The following will be given consideration when determining the orientation of a building:

- Deny aggressors a clear “line of sight” to the facility from on or off the depot where possible. Protect the facility against surveillance by locating the protected facility outside of the range or out of the view of vantage points. See Figure 12.2g.



▲ **Figure 12.2g**

*Deny Aggressors a Clear “Line of Sight” to Installation Assets from On or Off Post*

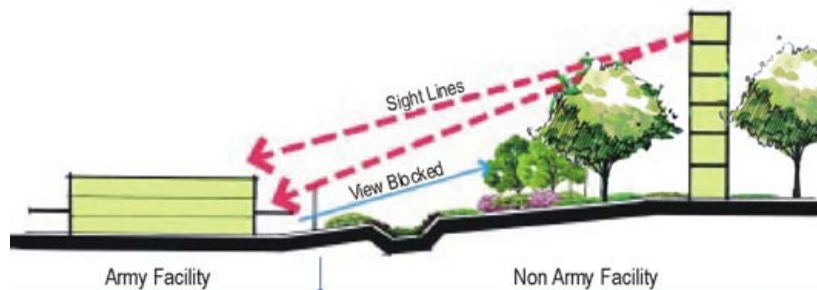
- Protect against attack by selecting perimeter barriers to block sightlines such as obstruction screens, trees, or shrubs. Non-critical structures or other natural or man-made features can be used to block sightlines. See Figure 12.2h.



▲ **Figure 12.2h**

*Use A Combination of Passive Barriers and Landscaping to Create a Protective Barrier*

- Provide passive vehicle barriers to keep Stationary Vehicle Bombs (SVBs) at distance from the assets (high curbs, low berms, shallow ditches, and landscape materials).
- Create “defensible space” by positioning facilities to permit building occupants and police to clearly monitor adjacent areas.
- If roads are nearby, orient buildings so no sides are parallel to vehicle approach routes.
- Design vehicular flow to minimize vehicle bomb threats, avoid high-speed approach into any critical or vulnerable area.
- Avoid siting the facility adjacent to high surrounding terrain, which provides easy viewing of the facility from nearby non-military facilities. See Figure 12.2i.



▲ **Figure 12.2i**

*Avoid Siting Facilities Adjacent to High Surrounding Terrain*

## 12.3 FENCING

Fences are used as protective measures against project-specific threats. They are most appropriately used to define boundaries and to deter penetration of a secure area. A fence will assist in controlling and screening authorized access to a secured area.

Fences also serve the following purposes:

- As a platform for the Intrusion Detection System.
- As a screen against explosive projectiles.
- To stop moving vehicles if they are reinforced to do so.

Plants with tall growth habits and/or large mature growth will be located well away from security fences.

## 12.4 LANDSCAPE CONSIDERATIONS

Landscaping guidelines for buildings should not be ignored because of standoff distances. The landscape design should enhance the overall attractiveness of the facility while still providing or enhancing the objective level of security level of security.

Guidelines to consider are:

- Establish clear zones along both sides of security fencing. Vegetation in the clear zone should not exceed four inches in height. Refer to [Section 10.12](#) for further information concerning landscape design requirements within a force protection buffer area. (DoD 0-2000.12-H, *Protection of DoD Personnel and Activities Against Acts of Terrorism and Political Turbulence*, Appendix EE, Table EE-4). For additional information consult [FM 19-30](#). This document gives guidance on physical security and barriers.
- Strategically locate trees and planters to prevent penetration of an attack vehicle into the secure area perimeter.
- Vegetative groupings, low barrier walls, and earth sheltering berms provide inherent blast effect reduction from external blast forces. See Figure 12.4a.



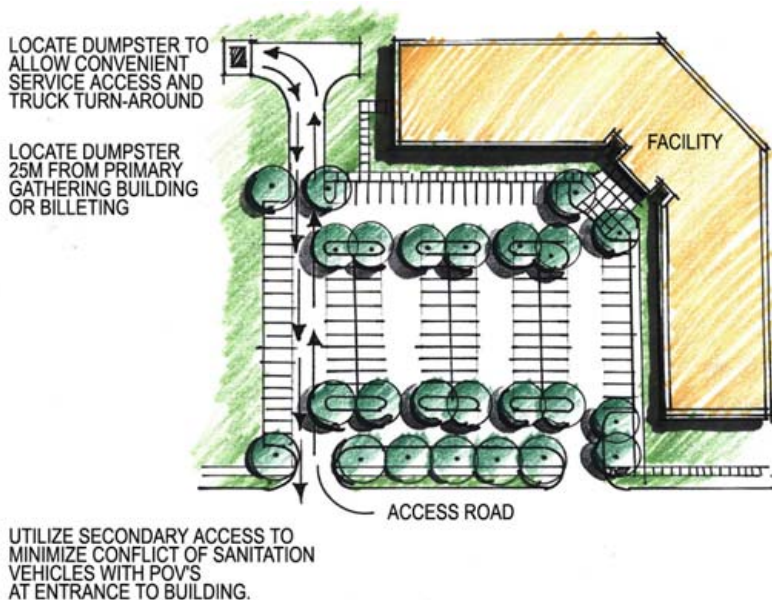
▲ **Figure 12.4a**

*Landscaping with Barrier Walls Provides Inherent Blast Effect Reduction From External Blast Forces*

- Plant material that can provide concealment will not be used adjacent to high security structures or fence lines.
- Use dense, thorn-bearing plant material to create natural barriers to deter aggressors.



- Screen play and outdoor recreation areas from public (off-installation) view.
- Designers need to balance the need for signs that identify, locate, and direct residents and supported personnel to installation assets, versus the need to discourage and frustrate hostile intelligence gathering and access. One method of achieving this balance could be to direct people to a community support or information center to obtain directions to high security activities. Another could be a sign “All incoming personnel and visitors report to building address 1557 Pass Street.”
- Antiterrorism/force protection requirements restrict the location of dumpsters and trash containers to a minimum of 10 meters (33 feet) from inhabited buildings and 25 meters (82 feet) from billeting and primary gathering areas ([Unified Facilities Criteria \[UFC\] 4-010-01, DoD Minimum Antiterrorism Standards for Buildings](#), Table B-1). See Figures 12.4b and 12.4c.



▲ **Figure 12.4c**

*Locate Trash Dumpsters 10 Meters From Inhabited Buildings*

- Be watchful of the unobstructed space. Ensure that vegetation and site features within 10 meters (33 feet) of inhabited buildings do not conceal from observation objects of 150mm (6 inches) in height. ([UFC 4-010-01](#), Appendix B, Para B-1.3). This does not preclude landscaping within the unobstructed space, but it will affect the design and may effect plant selection. See Figure 12.4d.



▲ **Figure 12.4b**

*Locate Trash Dumpsters 25 Meters From Billeting and Primary Gathering Areas*



▲ **Figure 12.4d**

*Landscaping Within the 10 Meter Unobstructed Space Should Enhance the Overall Attractiveness of the Facility While Providing the Objective Level of Security*



## 12.5 PARKING CONSIDERATIONS

Limitations on parking near buildings apply to all vehicles, including official and tactical vehicles, except for emergency vehicles and for operations support vehicles that are never driven out of restricted access areas. Government vehicles, other than those support and emergency vehicles, are included in the parking limitations because it is assumed that when they are out of restricted access areas they may be out of the immediate control of their operators, which could make them susceptible to having explosives placed on or inside of them. Government vehicles undergoing maintenance do not have to meet limitations and may be parked inside maintenance buildings while they are undergoing repairs.

Parking considerations are listed below:

- If possible, do not allow parking beneath the facility.
- If parking beneath a facility is unavoidable, access to the parking should be limited, secure, well lighted, and free of places of concealment.
- Do not authorize vehicles that have not been inspected to park under a building or within the exclusive zone, including at loading docks.
- If possible, locate visitor or general public parking near, but not on the site itself.
- Parking within the secured perimeter of an asset should be restricted to employees.
- Parking should be located in areas that provide the fewest security risks to DoD personnel.
- One way circulation within a parking lot can facilitate monitoring for potential aggressors.
- Locate parking within view of occupied facilities.
- Restrict parking from the interior of a group of buildings.
- Locate parking and service areas away from high-risk resources. See Figure 12.5a.
- Restrict parking within the stand-off zone. Controlled parking associated with existing inhabited buildings may be allowed to be as close as 10 meters (33 feet) without hardening or analysis if access control to the parking area is established at the applicable conventional standoff distance for parking. Active access control device must be used to control entry within the standoff distance. Barriers will also be installed at these entry and exit ways. These access control devices and barriers will meet the K-4 rating of the Department of State certified anti-ram vehicle barrier list. See Figure 12.5b.



▲ **Figure 12.5a**

*Locate Parking away from Inhabited Facilities*



▲ **Figure 12.5b**

*Parking is not Allowed Closer than 10 Meters of and Inhabited Building Without Hardening*

- When establishing parking areas, provide emergency communication systems at readily identified, well lighted, CCTV monitored locations to permit direct contact with security personnel.
- Provide parking lots with CCTV cameras and adequate lighting capable of displaying and videotaping lot activity.

## 12.6 BUILDING CONSIDERATION

After all appropriate force protection measures have been considered at the site planning and design level, measures must be considered to protect the ultimate terrorist target: the personnel with the facility. Designers must determine which measures are appropriate and cost effective to incorporate into the design. The design must balance force protection measures with the requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAG), Uniform Federal Accessibility Standards (UFAS), National Fire Protection Codes (NFPA), and all applicable local building codes.

From a force protection standpoint, the primary goals of building systems design are two: 1) design a safe building that will not fail when attacked, and 2) permit rescue teams to evacuate victims during rescue operations. The following building systems protective measures should be given consideration when determining the building designing:

### **Building Form**

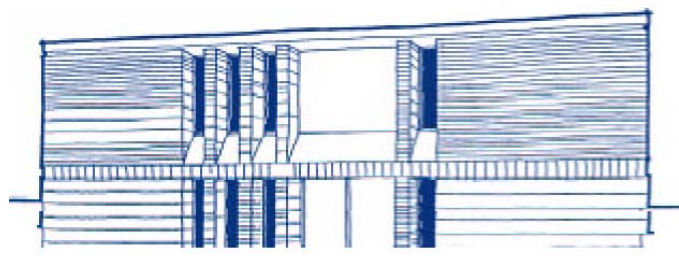
- Consider earth-sheltered design to reduce the asset's vulnerability to attack.
- Orient buildings horizontally rather than vertically to reduce the building's profile and exposure.
- Place the ground floor elevation of a building at four feet above grade to prevent vehicles from being driven to and into the facility.
- Avoid eaves and overhangs, since these can be points of high local pressure and suction during blasts. When these elements are used, they must be designed to withstand blast effects.
- Orient glazing perpendicular to the primary façade to reduce exposure to blast and projectiles
- Avoid having exposed structural elements such as columns on the exterior of the facility.
- Provide pitched roofs to allow launched explosives to roll off of the facility.
- Avoid re-entrant corners on the building exterior where blast pressures may build up.

- Substitute strengthened building elements and systems (hardening) when stand-off distances cannot be accommodated.
- Use ductile materials that are capable of very large plastic deformations without complete failure.
- Make roof access hatches securable from the interior.
- Provide blast-resistant walls when a high threat is present.
- Design facilities with a sacrificial sloping roof that is above a protected ceiling.
- Consider use of sacrificial exterior wall panels to absorb blast.
- Use earth tone-colored materials and finishes on exterior surfaces to diminish the prominence of a building.
- Consider reinforced concrete wall systems in lieu of masonry or curtain walls to minimize flying debris in a blast.
- Reinforced wall panels can protect columns and assist in preventing progressive collapse, as the wall will assist in carrying the load of a damaged column.

The seventeen recommended antiterrorism measures for enhanced site security should be considered for all new and existing inhabited buildings ([UFC 4-010-01](#), Appendix C, Para C-1.1 through C-2.7).

## **Windows**

- Eliminate windows adjacent to doors because the windows can be broken, allowing the door to be unlocked.
- Minimize the number and size of windows in a façade. If possible, limit the amount of glazed area in building facades to 15 percent. The amount of blast entering a space is directly proportional to the amount of opening on the façade.
- Consider using burglary- and ballistic-resistant glazing in high-threat areas.
- Consider using laminated glass in place of conventional glass.
- Consider window safety laminate (such as mylar) or another fragment-retention film over glazing to reduce fragmentation.
- Consider curtains, blinds and shades to limit entry of incendiary devices.
- Narrow recessed windows with sloping sills are less vulnerable than conventional windows. See Figure 12.6a.



▲ **Figure 12.6a**  
*Narrow Recessed Windows With Sloping Sills Are Less Vulnerable Than Conventional Windows*



- The operable section of a sliding window should be on the inside of the fixed section and secured with a metal rod or similar device placed at the bottom.
- Provide horizontal window six feet above the finished floor to limit entry.
- Windows can be hardened by steel window frames securely fastened or cement grouted to the surrounding structure.
- To minimize hazards from flying glass fragments, use 6-mm (1/4") nominal laminated glass for all exterior windows and glazed doors for new and existing inhabited buildings even if the minimum standoff distances are met. ([UFC 4-010-01, Appendix B, Para B-3.1](#)).

### **Doors**

- Provide hollow steel doors or steel-clad doors with steel frames.
- Provide blast-resistant doors for high threats and high levels of protection.
- Permit normal entry/egress through only one door, if possible.
- Limit exterior doors to a minimum while accommodating emergency egress. Doors are less attack-resistant than adjacent walls because of functional requirements, construction, and method of attachment.
- The weakest part of a door system is the latching component. Replace externally mounted locks and hasps with internally locking devices
- Where practical, doors should present blank, flush surfaces to the outside to reduce their vulnerability to attack.
- Locate hinges on interior or provide concealed hinges to reduce their vulnerability to attack.
- Emergency exit doors should only facilitate exiting movement.
- Equip any outward-opening double door with protective hinges and key-operated mortise-type locks.
- Provide solid doors or walls as a back-up for glass doors in foyers.
- Strengthen and harden the upright surfaces of a door jamb into which the door fits.
- Make roof access ladders removable, retractable or lockable.
- Protect utility openings to a facility from covert entry by installing screens or grates or attaching intrusion detection systems (IDS) sensors.

## 12.7 LIGHTING

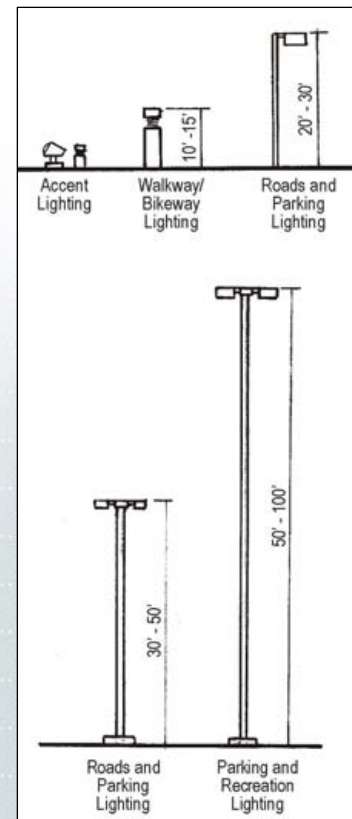
Lighting systems for security operations provide illumination for visual and closed-circuit television (CCTV) surveillance of boundaries, sensitive inner areas, and entry points. When CCTV is used as part of security operations, the lighting system will be coordinated with the CCTV system. The specific installation environment and the intended use determine lighting system requirements. Often two or more types of lighting systems are used within a single area, Figure 12.7a. Guidance on the use of security lighting may be obtained from [TM 5-811-1, Electrical Power Supply and Distribution](#).

## 12.8 BERMS AND EARTH TERRACING

The use of berms and terracing can fulfill one of more of the following functions.

- Define boundaries of property or boundary limits.
- Provide a barrier to moving vehicles.
- Hinder pedestrian movement.
- Intercept projectiles.
- Obstruct lines of sight.

Berms used to block lines of sight or projectiles must be high enough to achieve those objectives or may be combined with landscaping or other construction elements. Berms should maintain side slopes no greater than 4:1 to allow for mowing operations and should not, as a general rule, be higher than 6 feet from the lowest pavement elevation. Creation of an undulating pattern in the berm design helps to set a more natural presence to the area. Placement of plant material on slopes will need to allow for proper watering to ensure a healthy growth medium. Detailed design guidance is contained in Army Technical Manual (TM) 5-853-3/AFMAN 32-1071, Vol. 3, *Security Engineering Final Design*. This Army Technical Manual is a "For Official Use Only" document and is not accessible on the Army Corps of Engineers publications website. A copy of the manual can be acquired by ordering it through your standard publications account.



▲ **Figure 12.7a**  
*Lighting Creates a Deterrent*

## 12.9 GATE AND ENTRANCES (ACCESS CONTROL POINTS)

Installation entry points are key components in the force protection security program. The most effective entrances accommodate the functions of observation, detection, inspection, access control, and disablement of hostile personnel and vehicles, while containing the vehicles and pedestrians until access is granted. These areas are one of the most important installation features in the creation of a sense of arrival for both installation personnel and visitors. It is important that these areas present a positive public image. See Figure 12.9a.

The Headquarters Department of the Army, Office of the Provost Marshal General, Operations Branch (DAPM-OPS) in coordination with the Protective Design and Electronic Security Centers of Expertise developed standards for Army Access Control Points (ACP). [Standard Definitive Design for Access Control Points, Dec. 2004](#). See Figure 12.9b.



▲ Figure 12.9a

*Entrance Gates Should Create A Sense of Arrival and First Impression for Personnel and Visitors*

### 12.9.1 Canopies for ACPs

ACPs will have a canopy, which will cover the full width of incoming lanes at the Guard Booth. The canopy shall have a minimum clearance of 14.5 feet and shall have a minimum length of 50 feet. Supporting structure of roof will consist of columns sized and located to create peripheral vision for the



▲ Figure 12.9b

*The Access Control Point is Part of The Installation Perimeter and the First Line of Defense Strategy and A Legal Line of Demarcation*



guards with minimal obstructions. Lighting will provide a minimum of 10-foot-candles with a Color Rendition Index of 65. Measures will be taken to protect the canopy from the threat of an over-height vehicle. [The Interim Army Standard for Canopies at Army Installation Access Points, Feb. 2004.](#)

### 12.9.2 Physical Security Equipment

The Product Manager, Force Protection Systems (PM-FPS) under DoD Directive 3324.3 is assigned the mission of developing, fielding, and supporting Physical Security Equipment (PSE) throughout its life cycle for the Army, Joint Services, and other Government agencies.

The DoD Directive assigns specific areas of responsibility which include: interior PSE, Command and Control Systems, security lighting, force protection systems, barrier and systems, and interior and exterior robotics. Physical security may dictate that CCTV cameras with recording capabilities may be required at entrance gates. Physical security may dictate that CCTV cameras with recording capabilities may be required at entrance gates. The PM-FPS homepage and the DA-approved equipment Blank Purchase Agreements (BPAs) are listed below.

- [Product Manager – Force Protection Systems Homepage](#)
- [DA-approved PSE Equipment Blanket Purchase Agreements \(BPAs\)](#)

## 12.10 ARMY STANDARDS

The cited Army Standards shall be met.

- [Unified Facilities Criteria \(UFC\) 4-010-01, DoD Minimum Antiterrorism Standards for Buildings](#)
- *UFC 4-010-02, Design (FOUO): DoD Minimum Standoff Distances.* (This document is a “For Official Use Only [FOUO]” publication. User may contact the Point of Contact posted at the noted website for inquiries regarding this document).
- [Uniform Federal Accessibility Standards \(UFAS\)](#)
- [Americans with Disabilities Act Accessibility Guideline \(ADAAG\)](#)
- [DoD Instruction 2000.16, DoD Antiterrorism Standards](#)
- Field Manual 3-19.30, Chapter 4, [FM 19-30](#)
- [Engineering and Construction Bulletin \(ECB\) 2005-3, Army Standard Design for Access Control Points](#)

## 12.11 REFERENCES

The following references are provided for guidance.

- DoD Handbook 2000.12H, *Protection of DoD Personnel and Activities Against Acts of Terrorism and Political Turbulence*, February 1993 (This Handbook is a "For Official Use Only (FOUO)" publication. Users may contact the Point of Contact posted at the following website to obtain a copy of the Handbook.)  
<http://www.dtic.mil/whs/directives/corres/html/o200012h.htm>
- Army Regulation (AR) 525-13, The Army Force Protection Program (Available only through the [Army Knowledge Online](#) web portal.)
- UFC Security Engineering series are, UFC 4-020-01FA, UFC 4-020-02FA, UFC 4-020-03FA, and [UFC 4-020-04FA](#). The four volumes cover; Project Development, Concept Design, Final Design, and Electronic Security Systems respectively. UFC 4-020-04FA is available via the internet. Access to the other UFC's can be gained through the U. S. Army Corps of Engineers' [Protective Design Center \(PDC\)](#) web-based library. A user name and password are required. Site entry is restricted to U.S. Government agencies and their U.S. contractors. Also, a copy of the manuals can be acquired via a standard publications account.